

Predistribution of Potassium Iodide—the Tennessee Experience

EUGENE W. FOWINKLE, MD, MPH
SARAH H. SELL, MD
ROBERT H. WOLLE, BE, MPH

Dr. Fowinkle, formerly Commissioner of Public Health of Tennessee, is Associate Vice Chancellor for Medical Affairs, Vanderbilt University. Dr. Sell is medical consultant to the Commissioner and professor of pediatrics, emerita, Vanderbilt University School of Medicine. Mr. Wolle is environmental consultant, Bureau of Environment, Tennessee Department of Public Health.

Tearsheet requests to Eugene F. Fowinkle, MD, Associate Vice Chancellor for Medical Affairs, Vanderbilt University, D-3300 Medical Center North, Nashville, Tenn. 37232.

SYNOPSIS

Tennessee public health officials made a decision to predistribute potassium iodide tablets (KI) to householders in the vicinity of a nuclear powerplant. The tablets would be stored until needed in the event of a radiation emergency. The officials believed

that it was important to have the option available as a means of protecting nearby residents. KI, ingested before or soon after exposure to radioactive iodine, can act as a thyroid blocker to protect the gland from accepting further iodine and, therefore, the radiation.

A pilot project was undertaken to deliver, door to door, a package that contained KI tablets in sufficient quantity to supply a starter dose to each member of households within a 5-mile radius of the Sequoyah nuclear powerplant near Chattanooga. The package consisted of a vial of 14 130-mg tablets and a package insert from the manufacturer enclosed in a larger vial with a childproof cap.

Home visitors who delivered the vials were professionals from the local public health departments, especially trained to answer questions about the project. About 66 percent of 5,591 homes accepted the medication. Extensive coverage of the project by information media was helpful in explaining local emergency plans as well as the KI distribution to the public.

THE USE OF POTASSIUM IODIDE TO PROTECT the general public against the harmful effects if radioactive iodine should be released in a nuclear plant accident is currently a subject of debate and discussion among scientists and regulatory agencies. Recently, officials of the State of Tennessee made an administrative decision to provide the option of using KI in an emergency by distributing the medication to households within a 5-mile radius of a nuclear powerplant. This report details the process the officials followed in reaching a decision and the distribution of the potassium iodide tablets.

State officials, as part of their responsibility to protect the health and safety of Tennesseans, have had contingency plans prepared so that the State government can respond appropriately to emergencies of various types—both natural and manmade. Consequently, a specific set of plans has been developed, in cooperation with local government entities and the energy facility's managers, for each community where a nuclear powerplant is located or under construction. Nuclear power facilities have been constructed in two Tennessee communities. Con-

struction was begun, but has been deferred, at two other locations. The U.S. Nuclear Regulatory Commission requires plans for emergencies to be formulated before the plant begins operations as an integral part of the nuclear powerplant licensing process. The plans are also reviewed and approved by the U.S. Federal Emergency Management Agency. In fact, Tennessee's was the first radiation emergency response plan approved by that agency.

During two drills of the radiation emergency plan for the nuclear power plant, the distribution of potassium iodide to residents in the pathway of a plume of radiation was simulated. The distribution was too slow to protect people effectively.

The State of Tennessee Department of Public Health has various responsibilities in the development and implementation of plans for appropriate protective measures to be activated at the time of a nuclear event. The Commissioner of the department advises the Governor to initiate activities that may be appropriate to protect citizens from exposure to radiation.

During two drills of the radiation emergency plan for the Sequoyah nuclear powerplant, a Tennessee Valley Authority (TVA) unit near Chattanooga, the distribution of potassium iodide to residents in the pathway of a plume of radiation was simulated after an emergency had been declared. The distribution in these drills was too slow to protect people effectively. Therefore, predistribution of KI to nearby residents was considered to be worthwhile.

As part of the local contingency plan, a decision was made to distribute the KI tablets to individual households in a 5-mile radius of the Sequoyah plant. Householders' prompt access to the KI would provide decision makers with an option that would otherwise not be available unless the distribution had been accomplished before the emergency.

Our experience, and that of the local agencies participating in this project, leads us to the conclusion that such a measure can be accomplished successfully by professional health workers assisted by employees of the local utility, staff of Tennessee's Emergency Management Agency, and of other State and local agencies who helped in planning, preparation of supplies for the home visitors, and staffing stations to answer telephone queries.

Rationale

Radioactive iodine is a significant material that may be released in an accident at a nuclear powerplant (1). Potassium iodide, if taken before exposure to such material, can saturate the thyroid gland successfully and serve as a blocking agent, thereby preventing extended exposure to radioactive iodine and its concentration and retention in the gland beyond the period of exposure by inhalation. The use of the drug for this purpose has been approved by the Food and Drug Administration at doses of 130 mg per day for adults and children (half that dose for infants) for 3 to 10 days, depending on the amount of radioactive iodine released and the duration of the exposure. According to the draft recommendations for KI as a thyroid blocker (2), its use should be considered whenever the release is such that a radiation exposure dose to the thyroid gland

would be calculated to be in the 25 rad range. Its use is at the discretion of the State health authorities—in this area, the Commissioner of the State public health department. Maximal effectiveness of the blocking action requires prompt administration of the drug.

One author (E.W.F.) served as a consultant to the Public Health and Epidemiology Task Group of the President's Commission to investigate the Three Mile Island accident in 1980. His experience convinced us that it was necessary to make preparations to respond to foreseeable accidents and to designate in advance clear lines of authority. It was decided to take the necessary actions to allow the option of ordering the use of KI in the event of the release of significant amounts of radioactive iodine. Predistribution of KI tablets in the area near the Sequoyah plant would provide prompt access to the drug for those persons in the general population most likely to benefit by its early administration.

There are those who have disagreed—and are likely to continue to disagree—with this decision, but we believe strongly that it is wiser to have the option of using KI than to eliminate, by failing to act, that option in an emergency.

We believe that the question of predistribution versus distribution at the time of the event should be determined on a site-by-site basis. This decision should follow consideration of all, but perhaps not be limited to, the following factors:

1. Availability of KI
2. Size of the target population
3. Number of target households
4. Number of other types of facilities in the area (for example, industries, parks, schools)
5. Geographic characteristics
6. Overall evacuation plans
7. Availability of professional staff
8. Public acceptance
9. Meteorological conditions

A significant factor was the anticipated degree of public acceptance of the predistribution of KI tablets. There was concern that residents of the Sequoyah area would be unnecessarily frightened and alarmed by the distribution. The utility's officials expressed such worries and recommended that the process not be undertaken. We considered these points carefully, of course, but we in public health have found that if communications are open and there are attempts to make clear the reasoning, most people are able to make their own determina-

'We never intended to mandate the acceptance, storage, or taking of potassium iodide. We simply wanted people to know of its potential value as a preventive measure and to make it available to those who chose to have it in their homes.'

tions about such issues. We believed that if we found a way to give people the facts and let them know that KI was available, and if we made it clear that we were not trying to force anyone to take this medication, people could make responsible decisions for themselves and their families.

Methods

The KI, purchased by the TVA from Wallace Laboratories, Cranbury, N.J., was packaged in small, dark glass, screw-capped vials. Each vial contained 14 130-mg tablets. The labeling on the vial and the package insert clearly indicated that the drug was to be used only for thyroid-blocking in a radiation emergency. In the discussions preceding the final decision to distribute the KI, it seemed advisable to take steps to discourage indiscriminate use of the tablets. Therefore, as part of our preplanning, each vial was placed inside a larger clear brown plastic vial with a childproof cap. A package insert from the manufacturer was wrapped around the original vial so that the large-lettered label "THYRO-BLOCK" was easy to read through the plastic. In this way, the KI tablets and the package insert with its carefully worded information were together inside the larger vial with its special cap. It was a neat package to distribute to households. The decision to distribute a single package to each household was reached since that quantity would be sufficient to give each person a starter dose of 1 tablet for the first day and yet be insufficient to cause serious consequences if an overdose were taken accidentally. If additional doses are required during a radiation incident, there are plans to give detailed instructions at that time.

It was considered especially important to communicate with physicians in the Chattanooga area since they would be consulted by their patients who lived

in the predistribution zone. Therefore, the local medical society was alerted by a team of public health physicians who presented a program in which they explained to society members the project and the reasons for its development. The presentation also served to enhance the physicians' awareness of medical aspects of radiation emergencies, events which are unusual in routine general practice.

A letter from the Commissioner of Public Health was mailed to each household within the 5-mile radius of the Sequoyah plant. The TVA supplied the department with the names and addresses from the meter reader sheets. The letter advised the recipients that a member of the local health department staff would come to the home within the next few days to deliver a vial of KI tablets and to explain their use and reasons for supplying them.

The field staff selected to make the house-to-house deliveries were chosen from local public health professionals who were experienced in communicating. Among them were health educators, public health nurses, environmentalists, emergency medical service coordinators, and others. A total of 38 persons from the Southeast Tennessee Regional and Hamilton County Health Departments participated. A 1-day training session for them preceded the fieldwork. The mechanics of the project were explained as well as the rationale for drug use and special instructions for householders. The total emergency preparedness plan was also described, so that the staff were able to answer general questions from householders about the response plan for a nuclear accident in the area. The news media reporters were also invited to attend the session to hear the same information that prepared the home visitors for their tasks.

Results

The KI packages were distributed door to door from November 16 through December 11, 1981. The 38 health department staff members spent 166 person days visiting 5,591 homes. A total of 3,022 households accepted the tablets. If residents were not at home, a second letter was left. It informed them that they could obtain vials of tablets, if they desired, at two local health centers on three designated Saturdays during certain hours. An additional 682 households obtained supplies of KI from the health centers, making a total of 3,704 households (66 percent) that received the tablets by these two methods of delivery. A few more residents came to the main

offices of the local health department subsequently to pick up their supply. They gave various reasons for the delay.

A supply of 450 vials providing a first dose for 6,100 students has been placed in the two schools within the 5-mile area so that this measure of prevention is accessible to children without delay in the event of an emergency at the powerplant during school hours. A much larger reserve supply is also available at a central location in the Chattanooga area.

Discussion

The overall response of the householders to the project was strongly positive. It appears that the staff members, in addition to distributing the KI, were able to increase substantially the residents' level of information about emergency plans and what would take place should a nuclear accident occur. The home visitors were careful to emphasize that the distribution of KI and the entire planning process were preventive actions. It was explained that no accident was anticipated but, as with seatbelts or fire extinguishers, it is better to have the tablets although they may never be needed. Most people appeared to accept this logic.

Local officials in charge of the project and the participating workers reported that members of the media were persistent but amazingly positive in their presentations of this endeavor. Coverage of the project was extensive. During the week before and the initial week of the distribution there was intense public interest; answering questions from the press and the public required almost all the time of two physicians. Thereafter, each Monday and Tuesday produced a large number of inquiries during the 6-week period when the KI was distributed.

All three national television channels as well as local television crews were each on site at least twice, filming home visits in the area. The two local newspapers printed a total of 12 articles, including 4 in-depth releases each of 90 or more lines. At least 50 interviews were given by telephone to newspapers and radio stations across the country, and the Philadelphia Inquirer sent a reporter to the area.

Local health officials had wisely invited members of the media to the training session to ensure that they received ample correct information. The officials believed that this extensive coverage not only assisted in informing the affected residents about the project but also contributed largely to the overall success.

We did not achieve—nor did we expect to achieve—universal coverage of our target population. We never intended to mandate the acceptance, storage, or taking of KI. We simply wanted people to know of its potential value as a preventive measure and to make it available to those who chose to have it in their homes. We did that. In addition, we believe that we opened some lines of communication between area residents and the health department that will be mutually beneficial. These intangibles are not subject to precise cost-benefit analysis, but they are extremely important. Again, we are convinced that the program provides an important option in the protection of the public's health and that taking the action to ensure the availability of that option was the right thing to do.

References

1. Protection of the thyroid gland in the event of releases of radioiodine. NCRP Report No. 55, National Council on Radiation Protection and Measurement, Washington, D.C., 1979.
2. Potassium iodide as a thyroid-blocking agent in a radiation emergency; draft recommendations on use (prepared by the Bureau of Radiological Health and Bureau of Drugs) notice of availability. Federal Register 46: 30199, June 5, 1981.